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(54) Title: METHOD FOR CHARGING OF DATA REACHING A NETWORK ELEMENT OF A COMMUNICATION NETWORK DURING A DATA SESSION
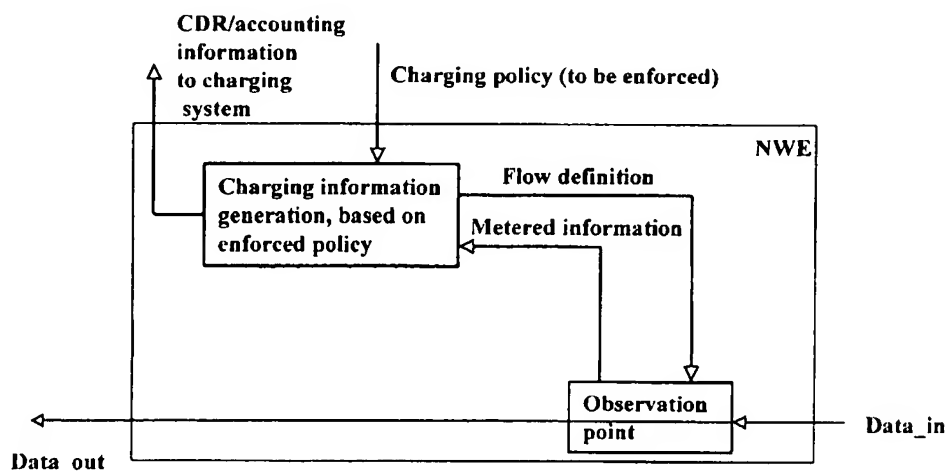
(57) Abstract: The present invention proposes a method for charging of data reaching a network element of a communication network during a data session, the data session comprising a plurality of data flows, with each flow being distinguishable by a set of flow parameters, the method comprising the steps of: enforcing a charging policy at the network element to be applied to said data, wherein said charging policy defines charging rules per flow; observing said data reaching said network element and detecting at least one flow of data; and matching said detected flow of data to an enforced charging policy, applying said matching charging policy to said flow, thereby generating charging information. Also, the present invention concerns a method for supplying a network element with a charging policy to be enforced at said network element for charging of data reaching said network element of a communication network during a data session. Additionally, corresponding devices are concerned by the present invention.

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TITLE OF THE INVENTION

Method for charging of data reaching a network element of a
communication network during a data session

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FIELD OF THE INVENTION

The present invention relates to a method for charging of
data reaching a network element of a communication network
10 during a data session, and correspondingly to a method for
supplying a network element with a charging policy to be
enforced at said network element for charging of data
reaching said network element of a communication network
during a data session.

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BACKGROUND OF THE INVENTION

Recently, communication networks have penetrated more and
more in every day life and are adopted by subscribers for
20 more and more services such as phone calls, data
transmission and the like. Also, so-called value added
services are implemented using communication networks.

With the increasing number of possible services available
25 for subscription in communication networks, also new
network types and/or subnetworks are emerging, while
interoperability therebetween is still given.

In view of this variety of services to be subscribed and
30 different networks/subnetworks used by subscribers when
using their terminals, network operators are facing
challenges in implementing new value added services based
on messaging applications over e.g. GPRS (General Packet
Radio Services).

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With the increasing variety of services and the different
qualities of services a subscriber can subscribe to,
charging and/or billing for services offered by the network
and used by the subscriber becomes rather complex.

Therefore, in this connection a new type of mediation
functionality for charging is needed, which is capable of
coping with additional requirements related to managing
prepaid challenges, controlling charging logic based on
context and processing capabilities of collected charging
information.

SUMMARY OF THE INVENTION

Consequently, according to an aspect of the present
invention, it is an object of the present invention to
provide an improved method for charging of data reaching a
network element of a communication network during a data
session.

In addition, according to a further aspect of the present
invention, it is an object of the present invention to
provide an improved method for supplying a network element
with a charging policy to be enforced at said network
element for charging of data reaching said network element
of a communication network during a data session.

According to an aspect of the present invention, the above
object is for example achieved by a method for charging of
data reaching a network element of a communication network
during a data session, the data session comprising a
plurality of data flows, with each flow being
distinguishable by a set of flow parameters, the method
comprising the steps of: enforcing a charging policy at the
network element to be applied to said data, wherein said

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charging policy defines charging rules per flow; observing
said data reaching said network element and detecting at
least one flow of data; and matching said detected flow of
data to an enforced charging policy, applying said matching
5   charging policy to said flow, thereby generating charging
information.

According to favorable further developments of the method,
        - the method comprises a step of forwarding said
10 generated charging information to a charging system of the
communication network;
        - enforcing is performed upon start-up of the network
element;
        - enforcing is performed upon activation of the data
15 session;
        - enforcing is performed dynamically during the life-
time of the data session;
        - upon enforcing said charging policy, data volume
counters and/or time counters are initialized.
20   - said data flows are Internet Protocol based packet
data flows, and said flow parameters comprise at least one
of an IP header field, a transport header field, and an
application level information;
        - said charging policy comprises at least one flow
25 parameter, and at least one of a charging/accounting type,
an accounting event trigger, a charging metrics, and a
tariffing indication;
According to a further aspect of the present invention, the
above object is for example achieved by a method for
30 supplying a network element with a charging policy to be
enforced at said network element for charging of data
reaching said network element of a communication network
during a data session, the method comprising the step of:
creating a plurality of charging policies, each comprising
35 at least one flow parameter, and at least one of a

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charging/accounting type, an accounting event trigger, a
charging metrics, and a tariffing indication, selecting a
charging policy based on offered services and subscriber
information, and distributing said selected charging policy
5   to at least one network element.

According to favorable further developments of the method,
- a charging policy is selected for a type of a network
element.
10

Furthermore, according to the present invention, the above
objects are for example achieved by a device for charging
of data reaching a network element of a communication
network during a data session, the data session comprising
15   a plurality of data flows, with each flow being
distinguishable by a set of flow parameters,
the system comprising: enforcing means adapted to enforce a
charging policy at the network element to be applied to
said data, wherein said charging policy defines charging
20   rules per flow; observation means adapted to observe said
data reaching said network element and detecting at least
one flow of data; and matching means adapted to match said
detected flow of data to an enforced charging policy,
application means adapted to apply said matching charging
25   policy to said flow, and generation means, responsive to
said application means, adapted to generate charging
information.

According to favorable further developments:
30   - the device further comprises forwarding means adapted to
forward said generated charging information to a charging
system of the communication network;
- said enforcing means are responsive to a start-up of the
network element to perform the enforcing;

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- said enforcing means are responsive to activation of the
data session to perform the enforcing;
- said enforcing means are dynamically performing the
enforcing during the life-time of the data session;
5   - the device further comprises initialization means adapted
to initialize data volume counters and/or time counters
responsive to enforcing said charging policy;
- said data flows are Internet Protocol based packet data
flows, and said flow parameters comprise at least one of an
10 IP header field, a transport header field, and an
application level information;
- said charging policy comprises at least one flow
parameter, and at least one of a charging/accounting type,
an accounting event trigger, a charging metrics, and a
15 tariffing indication.

Furthermore, according to the present invention, the above
objects are for example achieved by a device for supplying
a network element with a charging policy to be enforced at
20 said network element for charging of data reaching said
network element of a communication network during a data
session, the device comprising creation means adapted to
create a plurality of charging policies, each comprising at
least one flow parameter, and at least one of a
25 charging/accounting type, an accounting event trigger, a
charging metrics, and a tariffing indication, selection
means adapted to select a charging policy based on offered
services and subscriber information, and distribution means
adapted to distribute said selected charging policy to at
30 least one network element.

According to favorable further developments a charging
policy is selected for a type of a network element.

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By virtue of the present invention, which proposes a
generally improved method for charging of data reaching a
network element of a communication network during a data
session and an improved method for supplying a network
element with a charging policy to be enforced at said
network element for charging of data reaching said network
element of a communication network during a data session,
basically the following advantages can be achieved

- access charges are based on metering of data
sessions, which may contain several flows, which in turn
may be charged differently, e.g. reverse charged, free of
charge;

- charging end user (subscriber) for services provided
directly by third parties while also differentiating
charges for the access bearer;

- provisioning of charging logic and control of the
proper real time metering and accounting mechanism
differently per each flow of a specific service type.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, the present invention will be described
in greater detail with reference to the accompanying
drawings, in which

Fig. 1 shows in schematic outline the functionalities and
steps involved in the method for supplying a network
element with a charging policy to be enforced at said
network element for charging of data reaching said network
element of a communication network during a data session;
and

Fig. 2 shows in schematic outline the functionalities and
steps involved in the method for charging of data reaching

a network element of a communication network during a data
session.

Fig. 3 shows details of a device for charging of data
5   reaching a network element of a communication network
during a data session.

DETAILED DESCRIPTION OF THE EMBODIMENTS

10   In brief, with the proposed charging mediation
functionality, through a policy management interface the
operator is allowed to create and manage charging policies.
A charging policy decision logical function selects the
appropriate charging policy according to the offered
15   services and relevant subscription information. Via the
charging policy control interface, the charging policy is
sent to one or more network elements where it is locally
enforced to relevant processes. Charging policies for
access network devices such as GGSN are being considered
20   but it can also apply to other network elements depending
on the relevant needs such as core network elements, as
will be set out in greater detail herein below.

In order to create charging policies for access network
25   devices, a flow definition such as an IP flow definition is
required. An IP flow, or any other flow which need not
necessarily be based on the Internet Protocol IP, is a set
of packets passing an observation point in the network
during a certain time interval A set of IP flows (one or
30   more) can correspond to the usage of a certain application
or service differing from an application flow. There are
services which use single IP flow or services which use
more than one IP flows such as for example streaming or
rich call. All packets belonging to a particular flow have
35   a set of common properties derived from the data contained

in the packet and from the packet treatment at the
observation point. In the GPRS or 3G networks, the
observation point can be a Gateway GPRS Support Node GGSN
with additional capabilities. Packets are mapped to flows
5   by evaluating their properties. Packets with common
properties are considered to belong to the same flow. A
packet showing at least one difference in the set of
properties is considered to belong to a different flow.
Depending on the specific case, only a subset of the
10 properties could be used to distinguish flows or else extra
parameters such as application level information (e.g.
Uniform Resource Locator URL) may be required to
distinguish application data flows (consisting of one or
more IP flows)

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This will be explained in greater detail with reference to
Fig. 1. Fig. 1 shows in schematic outline the charging
mediation functionality CMF and involved functionalities /
steps involved in the method for supplying a network
20 element with a charging policy to be enforced at said
network element for charging of data reaching said network
element of a communication network during a data session.

As shown in Fig. 1, the charging mediation functionality
25 CMF comprises a policy management interface functionality.
This policy management interface is adapted to create
charging policies. The creation is based on an operator
input as well as on input flow definitions. A flow
definition defines a flow of data, which are packet data.
30 Thus, properties of the packets define a flow in that all
packets having the same properties belong to the same flow.
A property of a packet and/or flow is also referred to as
attribute.

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Among the items input as operator input there are at least
one of a charging/accounting type, an accounting event
trigger, a charging metrics, and a tariffing indication,
which is/are mapped and/or assigned to a corresponding flow
5 distinguished from other flows by a set of packet flow
attributes. For example, charging/accounting type is
defined by an indication whether online accounting
(prepaid, hot billing) or off-line accounting is to be
effected. As accounting event triggers are possible (either
10 one or several in combination): QoS changes, tariff
changes, time thresholds and/or volume thresholds. Charging
metrics include a volume metering (which is On/Off), a time
metering (which is On/Off), a QoS metering (which is
On/Off) (either one or several in combination). Further,
15 tariffing comprises an indication of the tariff class and a
co-assigned value of the tariff.

The above input is supplied by the operator, e.g.
„manually„ or as a preconfigured file.
20

As regards properties of the packets defining a flow, these
properties may also be input by the operator as the above
items. Nevertheless, the properties may also be supplied as
a result obtained at an observation point or measurement
25 device monitoring data flows or directly by an application.
Irrespective of whether input manually or as a result of a
measurement or by an application, the properties/attributes
of the packets defining a flow may comprise for example
source address and port; destination address and port;
30 Layer 3 Protocols used (Network protocols); TOS (IPv4 Type
Of Service); Traffic Class (IPv6); Flow Identifier; URL (if
needed); Destination Classification such as internal /
partner / external (e.g. „Sonera„, partner or external).

To each set of attributes/properties of a flow is mapped a corresponding set of operator specified input items listed above to thereby define a charging policy for the respective flow.

5

Thus, at the output of the policy management interface as plurality of charging policies and/or charging rules is defined, which serve as an input to a charging policy decision/selection functionality. At the selection

10 functionality, a charging policy is selected out of said plurality of policies. The selection is based on information on offered services as well as information on relevant subscribers also supplied to the selection functionality. The information related to offered services

15 is provided by the network operator, e.g. upon network configuration, while information on relevant subscribers can be obtained e.g. from subscriber databases such as the home subscriber server HSS or the like.

20 At the output of the selection functionality, one charging policy is then present which is distributed via a charging policy control functionality to one or more network elements. The charging policy thus selected may for example be selected for a specific network element type such as an

25 access network element (e.g. GGSN) or a core network element (e.g. Application server APS or Call Processing server CPS (sometimes also denoted as Connection Processing Server)). Then, the selected charging policy can be distributed to all network elements of the same type

30 concerned.

The above description has mainly be given with regard to the parameters used in connection with access network elements, while in case of core network elements, at least

35 the following parameters as an example could at least be

part of a charging policy delivered to the core network
elements (in addition or alternatively to those mentioned
above in connection with access network elements):
charging/accounting type (online accounting (prepaid, hot
billing), off-line accounting), accounting event triggers
(URL, time change, service class change, add/remove media
component, Session Initiated Protocol SIP Method 1 with
list of messages, SIP Method n with list of messages),
charging metrics (content size (On/Off), time metering
(On/Off), number of transactions (On/Off), tariffing
(tariff class and value).

Charging policies could be enforced to core network
elements such as CPS to indicate which event, sequence of
events or actions could trigger accounting actions.

Thus, with regard to the method for supplying a network
element with a charging policy to be enforced at said
network element for charging of data reaching said network
element of a communication network during a data session,
the foregoing made clear that the method comprises the
steps of creating a plurality of charging policies, each
comprising at least one flow parameter, and at least one of
a charging/accounting type, an accounting event trigger, a
charging metrics, and a tariffing indication, selecting a
charging policy based on offered services and subscriber
information, and distributing said selected charging policy
to at least one network element.

Also, a respective charging policy is for example selected
for a type of a network element and distributed to all
network elements of said specific type. In case of access
network elements such as GGSN, enforced charging policies
for Access Network Devices such as GGSN define the
triggering detection points for a chargeable flow.

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Fig. 2 shows in schematic outline the functionalities and steps involved in the method for charging of data reaching a network element of a communication network during a data session.

5

As shown, data reaching a network element (data_in) pass through an observation point (here illustrated to be located in the network element). An observation point is a measurement equipment located in the network at which data

10 packets such as IP based packets can be observed and their properties can be determined. Examples are a line to which a probe is attached, a shared medium such as an Ethernet based Local Area Network LAN, a single port of a router or a set of interfaces (physical or logical) of a router. As a

15 result of the flow or flows being observed at the observation point, a flow record (per flow) is obtained. A flow record contains information about a specific flow that was metered at the observation point, and more particularly, contains measure properties of the flow such

20 as the total number of bytes of all packets of the flow and usually characteristic properties of the flow such as an IP source address. A plurality of flows are also referred to as a session. Such a session may for example be a PDP context (PDP: Packet Data Protocol) or any other logical

25 context.

Stated in other words, the observation point yields information on flow definitions of the flows contained in the current session, the data of which are passing through

30 the observation point.

These information on the flows, i.e. the flow records of the individual flows are forwarded to a charging information generation entity. At the charging information

35 generation entity, the charging policies received from the

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charging mediation functionality are enforced, i.e.
rendered valid for charging purposes. Thus, based on the
enforced charging policy at the network element and the
observed flow parameters (metered information), charging
5   information is generated and forwarded, e.g. as a call
detail record CDR (also referred to as a Charging Data
record) or as a RADIUS/DIAMETER accounting information
(Remote Authentication Dial In User Service (RADIUS)), to a
charging system of the network.
10

Stated in other words, the present invention concerning a
method for charging of data reaching a network element of a
communication network during a data session, the data
session comprising a plurality of data flows, with each
15   flow being distinguishable by a set of flow parameters,
comprises the steps of enforcing a charging policy at the
network element to be applied to said data, wherein said
charging policy defines charging rules per flow; observing
said data reaching said network element and detecting at
20   least one flow of data; and matching said detected flow of
data to an enforced charging policy, and applying said
matching charging policy to said flow, thereby generating
charging information.

25   Of course, there is also conceived a forwarding of said
generated charging information to a charging system of the
communication network.

The charging policy for access network devices defines, in
30   case of an IP flow as an example of a flow of a session
such as a PDP context, the IP flow specification that must
be distinguished upon being measured as well as the
relevant accounting action to be taken upon being
distinguished. A charging policy can for example suppress

accounting/charging for the distinguished data flow and assign a tariff class 0.

Enforcement of charging policies to access network devices such as GGSN can be realized during start up or upon session, i.e. PDP context activation. In addition, charging policies can be enforced to access network devices such as a GGSN dynamically during the context lifetime. When a charging policy is enforced to the access network device, it initiates the creation of volume and/or time counters. Such counters are initiated upon receiving the charging policy and appropriate accounting actions are triggered as specified within the charging policy. Charging policy enforced to GGSN in principle remains active only during the lifetime of the context. However, in certain cases, it is possible to maintain charging policies active within the access network device regardless of the context lifetime. Such charging policies apply for services independently of the subscriber base. Furthermore, application level information carried as payload within the IP packets such as URL specification can be needed as parameters in order to distinguish the IP Flow. In particular, there are several occasions on which the information at Layer 2/Layer 3 is not enough to distinguish the appropriate IP Flow, and in which cases the application level information will additionally be referred to for unambiguously distinguishing the flows (at least one) which correspond to the use of the application or service.

Thus, summing up the above, as regards the enforcing, this is performed upon start-up of the network element, while enforcing may also be performed upon activation of the data session (such as a PDP context). Considering an active session, enforcing may also be performed dynamically during the life-time of the data session.

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It is further to be understood that upon enforcing said
charging policy, data volume counters and/or time counters
are initialized at the network element, more specifically,
at the charging information generation functionality.
5   Even though said data flows are not restricted to Internet
Protocol based packet data flows, and in case of IP based
data flows, said flow parameters comprise at least one of
an IP header field, a transport header field, and an
application level information.
10

More particularly, as regards the flow parameters to be
observed, concerning
        - IP Header Fields, the measuring device is capable of
separating the flows by the following fields of the IP
15   header as indicated: Source IP address, Destination IP
address, Transport protocol type (Layer 4 protocol type),
IP version number, TOS (IPv4 Type of Service), Traffic
Class (IPv6);
        - Transport Header Fields, the measuring device is
20   capable of separating flows by the port numbers of the
transport header in case of Transmission Control Protocol
TCP or User Datagram Prototcol UDP being used as transport
protocol. Both source and destination port number are
supported for distinguishing flows, individually as well as
25   in combination;
        - application level information carried as payload
within the data packets (e.g. URL), this information can
also be used as parameter to distinguish data flows (at
least one data flow).
30

An enforced charging policy comprises, as stated further
above at least one flow parameter as mentioned above, and
at least one of a charging/accounting type, an accounting
event trigger, a charging metrics, and a tariffing
35   indication (explained above).

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Even though herein above the present invention has been
described with a focus on the method aspect, it is of
course to be understood that the invention also concerns
5   corresponding devices.

Fig. 3 shows details of such a device, labeled in Fig. 2
merely as „charging information generation, based on
enforced policy", which are surrounded in Fig. 3 by a
10   dashed line.

Thus, the device for charging of data reaching a network
element of a communication network during a data session,
the data session comprising a plurality of data flows, with
15   each flow being distinguishable by a set of flow
parameters, comprises enforcing means adapted to enforce a
charging policy at the network element to be applied to
said data, wherein said charging policy defines charging
rules per flow. The policy/policies is/are received from
20   outside, e.g. from a device for supplying a network element
with a charging policy to be enforced and as described
later on.

Furthermore, an observation means is provided which is
25   adapted to observe said data reaching said network element
and detecting at least one flow of data. The observation
means may be part of the device for charging or considered
as a separate unit, while however it is in cooperation with
the device for charging if considered separate.
30

In addition, the device comprises a matching means adapted
to match said detected flow of data to an enforced charging
policy, and application means adapted to apply said
matching charging policy to said flow, and still further

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generation means, responsive to said application means, adapted to generate charging information.

The charging policy is received at the enforcing means
5   where it is rendered valid to be enforced and e.g. buffered in a memory (not shown). The enforcing means informs the matching means of the policy. The matching means in turn supplies a flow definition (to be detected) to the observation means, which returns information on detected
10 flow definitions to the matching means. In case the flow definitions (the detected and the one to be detected) are matching (identical), the matching means triggers the application means to apply the enforced policy to metered information received from the observation means. The
15 application means then forwards the available information to the generation means where the charging information as such is generated.

In addition, as shown in Fig. 3, the device further
20 comprises forwarding means adapted to forward said generated charging information from the generation means to a charging system of the communication network.

Similarly as explained in connection with the corresponding
25 method, said enforcing means are responsive to a start-up of the network element to perform the enforcing, or said enforcing means are responsive to activation of the data session to perform the enforcing, or said enforcing means are dynamically performing the enforcing during the life-
30 time of the data session.

Also, the device further comprises initialization means (not shown) which are adapted to initialize data volume counters and/or time counters responsive to enforcing said
35 charging policy.

Like in connection with the explanations of the method
further above, Said data flows are Internet Protocol based
packet data flows, and said flow parameters comprise at
5   least one of an IP header field, a transport header field,
and an application level information. Said charging policy
comprises at least one flow parameter, and at least one of
a charging/accounting type, an accounting event trigger, a
charging metrics, and a tariffing indication.
10

Also, even though not shown in detail in the Figures, but
as outlined in Fig. 1, the present invention concerns a
device for supplying a network element with a charging
policy to be enforced at said network element for charging
15   of data reaching said network element of a communication
network during a data session, the device comprising
creation means adapted to create a plurality of charging
policies, each comprising at least one flow parameter, and
at least one of a charging/accounting type, an accounting
20   event trigger, a charging metrics, and a tariffing
indication, selection means adapted to select a charging
policy based on offered services and subscriber
information, and distribution means adapted to distribute
said selected charging policy to at least one network
25   element. A charging policy is selected for a type of a
network element.

Accordingly, as has been described herein before, the
present invention proposes a method for charging of data
30   reaching a network element of a communication network
during a data session, the data session comprising a
plurality of data flows, with each flow being
distinguishable by a set of flow parameters, the method
comprising the steps of: enforcing a charging policy at the
35   network element to be applied to said data, wherein said

charging policy defines charging rules per flow; observing
said data reaching said network element and detecting at
least one flow of data; and matching said detected flow of
data to an enforced charging policy, applying said

5   matching charging policy to said flow, thereby generating
charging information. Also, the present invention concerns
a method for supplying a network element with a charging
policy to be enforced at said network element for charging
of data reaching said network element of a communication

10   network during a data session. Additionally, corresponding
devices are concerned by the present invention.

While the invention has been described with reference to a
preferred embodiment, the description is illustrative of

15   the invention and is not to be construed as limiting the
invention. Various modifications and applications may occur
to those skilled in the art without departing from the true
spirit and scope of the invention as defined by the
appended claims.

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LIST OF REFERENCE SIGNS USED IN FIG. 1

IN1:

Operator input (e.g. at least one of charging/accounting
5   type, an accounting event trigger, a charging metrics, and
a tariffing indication)

IN2:

Flow definitions (packet properties), e.g. from observation
10   point or application

P1:

policies

15   IN3:

Information on offered services (e.g. defined by operator)

IN4:

Information on subscribers (e.g. from HSS)
20

P2:

Selected policy (e.g. per network element type)

P3:

25   Selected policy distributed to network elements such as of
type „GGSN"

I/F: Interface

30   CMF: charging mediation functionality

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Claims

1. A method for charging of data reaching a network element of a communication network during a data session,

5   the data session comprising a plurality of data flows,
               with each flow being distinguishable by a set of
          flow parameters,
the method comprising the steps of:
          enforcing a charging policy at the network element to
10 be applied to said data, wherein said charging policy
defines charging rules per flow;
          observing said data reaching said network element and
detecting at least one flow of data; and
          matching said detected flow of data to an enforced
15 charging policy,
          applying said matching charging policy to said flow,
thereby generating charging information.

2. A method according to claim 1, further comprising a step
20   of
          forwarding said generated charging information to a
charging system of the communication network.

3. A method according to claim 1, wherein
25   enforcing is performed upon start-up of the network
element.

4. A method according to claim 1, wherein
          enforcing is performed upon activation of the data
30 session.

5. A method according to claim 4, wherein
          enforcing is performed dynamically during the life-
time of the data session.

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6. A method according to claim 1, wherein
    upon enforcing said charging policy, data volume
counters and/or time counters are initialized.

5   7. A method according to claim 1, wherein
        said data flows are Internet Protocol based packet
data flows, and
        said flow parameters comprise at least one of an IP
header field, a transport header field, and an application
10 level information.

8. A method according to claim 1, wherein
        said charging policy comprises
            at least one flow parameter, and
15   at least one of a charging/accounting type, an
        accounting event trigger, a charging metrics, and a
        tariffing indication.

9. A method for supplying a network element with a charging
20 policy to be enforced at said network element for charging
of data reaching said network element of a communication
network during a data session,
        the method comprising the step of:
        - creating a plurality of charging policies,
25   each comprising
            at least one flow parameter, and
            at least one of a charging/accounting type, an
        accounting event trigger, a charging metrics, and a
        tariffing indication,
30   - selecting a charging policy based on offered
services and subscriber information, and
        - distributing said selected charging policy to at
least one network element.

35 10. A method according to claim 9, wherein

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a charging policy is selected for a type of a network element.

11. A device for charging of data reaching a network
element of a communication network during a data session,
        the data session comprising a plurality of data flows,
            with each flow being distinguishable by a set of
        flow parameters,
    the system comprising:
        enforcing means adapted to enforce a charging policy
    at the network element to be applied to said data, wherein
    said charging policy defines charging rules per flow;
        observation means adapted to observe said data
    reaching said network element and detecting at least one
    flow of data; and
        matching means adapted to match said detected flow of
    data to an enforced charging policy,
        application means adapted to apply said matching
    charging policy to said flow, and
        generation means, responsive to said application
    means, adapted to generate charging information.

12. A device according to claim 11, further comprising
        forwarding means adapted to forward said generated
    charging information to a charging system of the
    communication network.

13. A device according to claim 11, wherein
        said enforcing means are responsive to a start-up of
    the network element to perform the enforcing.

14. A device according to claim 11, wherein
        said enforcing means are responsive to activation of
    the data session to perform the enforcing.

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15. A device according to claim 14, wherein
said enforcing means are dynamically performing the
enforcing during the life-time of the data session.

5   16. A device according to claim 11, further comprising
initialization means adapted to initialize data volume
counters and/or time counters responsive to enforcing said
charging policy.

10   17. A device according to claim 11, wherein
said data flows are Internet Protocol based packet
data flows, and
said flow parameters comprise at least one of an IP
header field, a transport header field, and an application
15   level information.

18. A device according to claim 11, wherein
said charging policy comprises
at least one flow parameter, and
20   at least one of a charging/accounting type, an
accounting event trigger, a charging metrics, and a
tariffing indication.

19. A device for supplying a network element with a
25   charging policy to be enforced at said network element for
charging of data reaching said network element of a
communication network during a data session,
the device comprising:
- creation means adapted to create a plurality of
30   charging policies,
each comprising
at least one flow parameter, and
at least one of a charging/accounting type, an
accounting event trigger, a charging metrics, and a
35   tariffing indication,

- selection means adapted to select a charging policy based on offered services and subscriber information, and
- distribution means adapted to distribute said selected charging policy to at least one network element.

5

20. A device according to claim 19, wherein
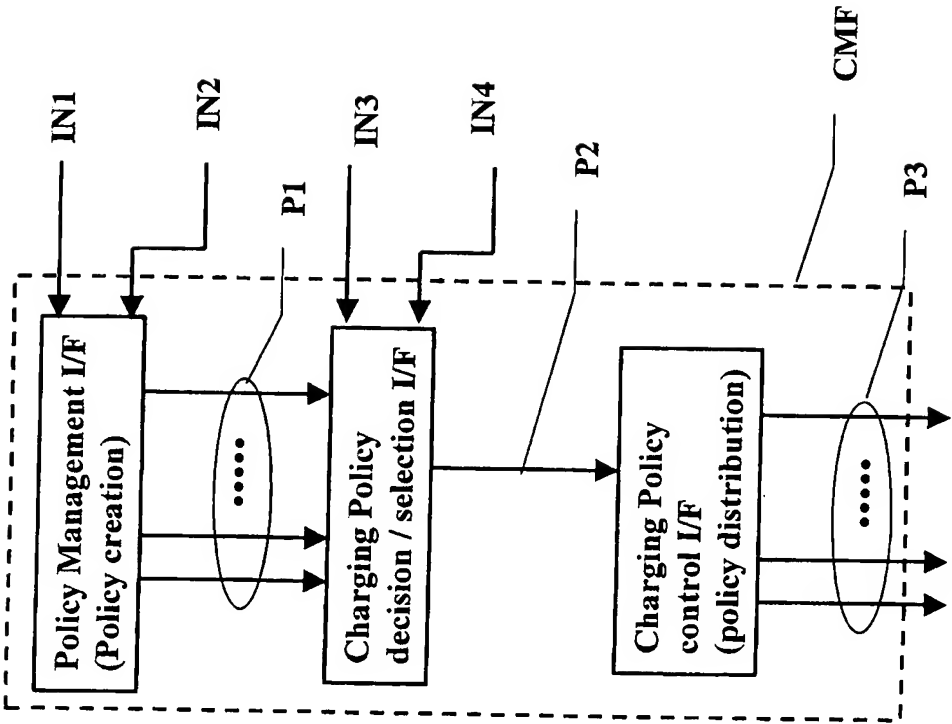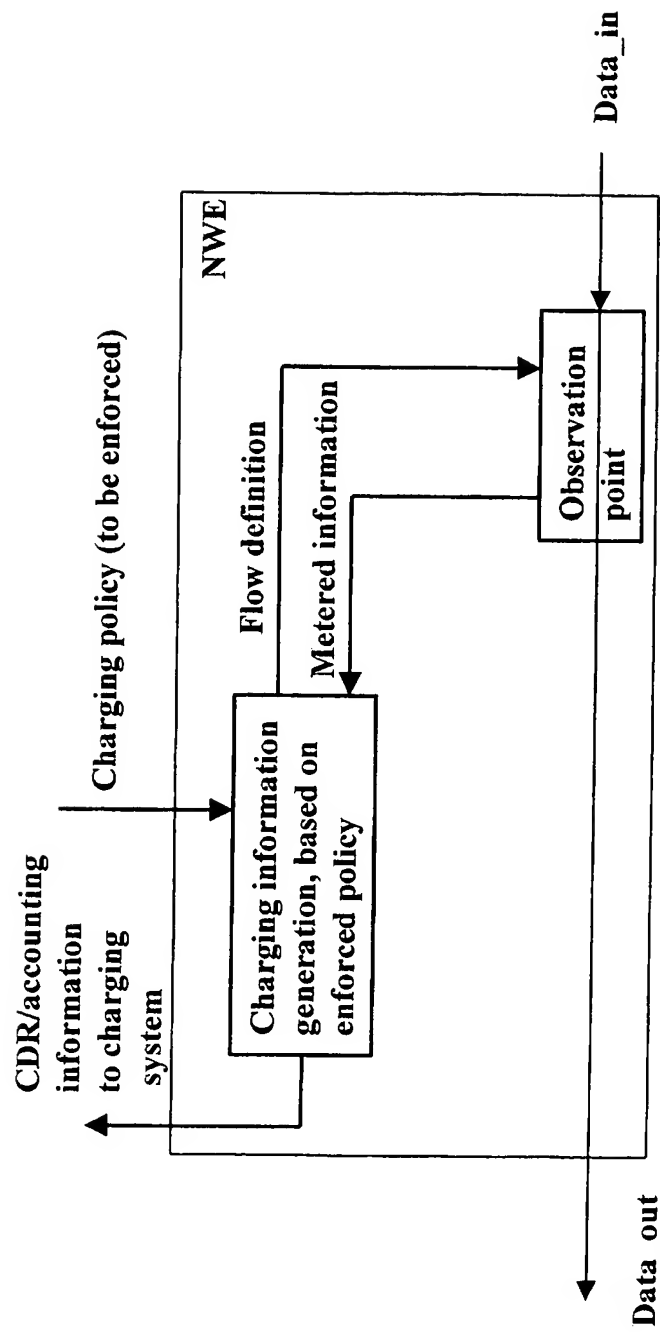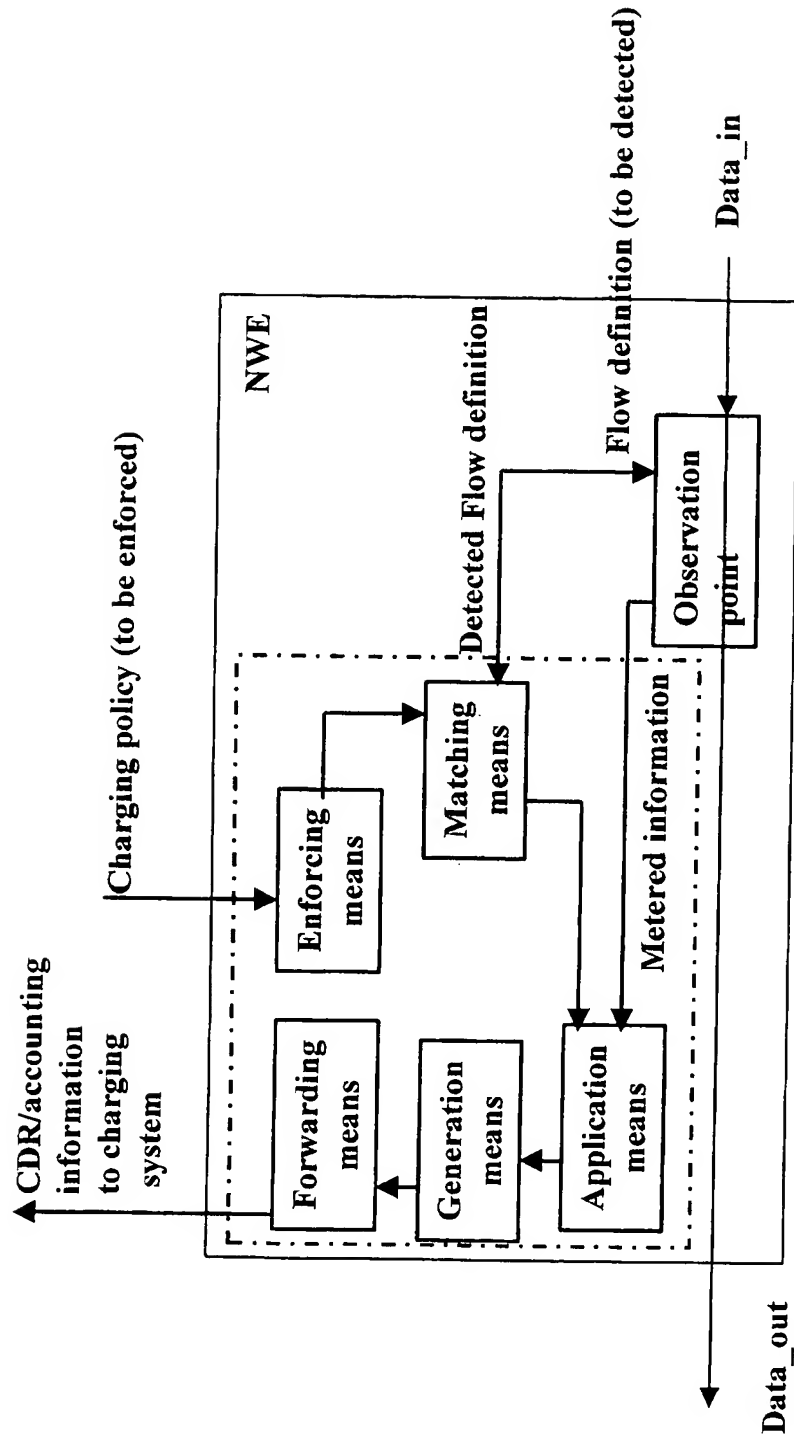a charging policy is selected for a type of a network element.

Fig. 1

Fig. 2

Fig. 3

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7   H04M15/00   H04L12/14   H04L12/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7   H04M H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category°	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 01 69891 A (HUOSTILA TERO ;JUNTUNEN ARI (FI); KEINAENEN KIMMO (FI); SONERA OYJ) 20 September 2001 (2001-09-20) page 3, line 32 -page 6, line 35 abstract ---	1-20
A	WO 99 65186 A (LIEROP JEROEN JOZEF VAN ;KONINKL KPN NV (NL); MANDJES MICHAEL ROBE) 16 December 1999 (1999-12-16) abstract ---	1-20
A	WO 01 78317 A (ITO TAKESHI ;NAKAI JUN (JP); HARUNA TAKAAKI (JP); JAPAN COMM INC () 18 October 2001 (2001-10-18) abstract ---	1-20

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 May 2003	2 6 MAY 2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	BEHROZ MORADI/JA A

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	PATENT ABSTRACTS OF JAPAN vol. 2002, no. 08, 5 August 2002 (2002-08-05) & JP 2002 111910 A (MITSUBISHI ELECTRIC CORP), 12 April 2002 (2002-04-12) abstract ---	1-20
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